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10/560,593

12/13/2005

Takeshi Azami

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EXAMINER

GREGORIO, GUINEVER S

ART UNIT

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1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|---|-------------------------------------|--|
| Office Action Summary | Application No. 10/560,593 | Applicant(s) AZAMI ET AL. | |
| | Examiner GUINEVER S. GREGORIO | Art Unit 1793 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09/18/2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 21-29 have been considered but are moot in view of the new ground(s) of rejection.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. Claims 21 and 24 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/544,400 in view of Yukishige et al. (Jap. Pub. No. 61-291966). App. No. 10/544,400 teaches a graphite target which would inherently or obviously possess an impact site, an apparatus which inherently or obviously comprises a chamber for which said target is housed, a light source for irradiating a cylindrical surface of said graphite

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target, and a collecting unit which possesses a pipe for collecting carbon vapor evaporated from said graphite target by irradiation with said light as carbon nanotubes (claim 1).

App. No. 10/544,400 does not teach a first pipe. Yukishige et al. teaches a laser beam is introduced through a window and a gas is introduced through a port in the pipe so that the vapor is not deposited onto the window (abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to place a pipe between the window where the laser is introduced and the target to decrease the maintenance performed on the window for cleaning.

2. Regarding claim 24, Application No. 10/544,400 teaches a movement unit for moving the cylindrical graphite target which corresponds to a rotating cylinder. Examiner takes the position that the second angle would be inherent or an obvious part of the process of irradiating the graphite target.

This is a provisional obviousness-type double patenting rejection.

3. Claims 21-29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/544,400 in view of Yukishige et al. (Japanese Pub. No. 61-291966). App. No. 10/544,400 teaches a graphite target which would inherently or obviously possess an impact site, an apparatus which inherently or obviously comprises a chamber for which said target is housed, a light source for irradiating a cylindrical surface of said graphite target, and a collecting unit which possesses a pipe for collecting carbon vapor

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evaporated from said graphite target by irradiation with said light as carbon nanotubes (claim 1). App. No. 10/544,400 does not teach a first pipe.

Yukishige et al. teach a laser evaporation device comprising a chamber, laser, window, protective pipe, and reflecting mirror (abstract). Yukishige et al. teach a protective pipe located between the laser and sample to be vaporized (abstract). Yukishige teaches introducing gas into the pipe to prevent the sticking of vapor deposition material onto the window (abstract). Yukishige et al. teach passing a light beam through the hollow pipe onto a mirror for reflecting the beam onto a target. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the apparatus of App. No. 10/544,400 with a protective pipe around a part of the laser between the window and the target, as taught by Yukishige et al., to prevent the sticking of vapor deposition material onto the window and thereby reducing the amount of maintenance required and also ensuring the path of the laser beam is not affected by said vapors..

This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Pat. No. 6,648,975 B2) in view of Yukishige et al. and Iijima et al. (Nano-Aggregates of Single-Walled Graphitic Carbon Nano-Horns, Chemical Physics Letters; 309 Pages 165-170; 1999).
5. Suzuki et al. teaches a target with an impact site (207), a chamber in which target is housed (101), a window in a wall of said chamber for passage of light (204), a light source that irradiates the light through said window on to impact site (205), plume

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at an angle different from impact angle (208), and a second pipe extending from recovery chamber (209) (Figure 6). Suzuki et al. does not teach graphite target or a pipe located between the target and the window.

Yukishige et al. teach a laser evaporation device comprising a chamber, laser, window, protective pipe, and reflecting mirror (abstract). Yukishige et al. teach a protective pipe located between the laser and sample to be vaporized (abstract). Yukishige teaches introducing gas into the pipe to prevent the sticking of vapor deposition material onto the window (abstract). Yukishige et al. teach passing a light beam through the hollow pipe onto a mirror for reflecting the beam onto a target. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the apparatus of Suzuki et al. with a protective pipe around a part of the laser between the window and the target, as taught by Yukishige et al., to prevent the sticking of vapor deposition material onto the window and thereby reducing the amount of maintenance required and also ensuring the path of the laser beam is not affected by said vapors.

Iijima et al. teach forming single-walled graphitic carbon nano-horns using an apparatus comprising a graphite target, laser source, vacuum chamber, a ZnSe lens system for adjustment of the laser beam intensity, and a collection filter to collect the single-walled graphitic carbon nano-horns (paragraph 4). Examiner takes the position the "lens system" functions as a widow unit for the laser beam to enter the vacuum chamber. Additionally, Iijima teaches a graphite target rod that is rotated about its axis (paragraph 5, line 5). It would have been obvious to one of ordinary skill in the art at the

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time of the invention to use the apparatus taught by Suzuki et al. modified by the protective pipe to make the nanocarbons taught by Iijima et al. because the apparatus taught by Suzuki et al. provides an efficient and controllable method for producing nanocarbons.

6. Regarding claims 22 and 26, Suzuki et al. does not teach a reflector in said first pipe that directs light from said window toward said impact site. Although, Yukishige teaches a pipe and a reflector. Yukishige does not teach a pipe around the reflector however Examiner takes the position that placing the pipe around the mirror would be an obvious modification to the apparatus. Firstly, the pipe serves as a means for protecting what is enclosed from the particles generated by the laser impact on the substrate. The amount of vapor produced will vary depending on the substrate. Also the distance from the reflective mirror to the substrate will determine whether the mirror will be exposed to an excessive amount of vapor. It would be reasonable to conclude that one of ordinary skill in the art would obviously determine, without undue experimentation, whether the addition of a protective pipe would be reflective mirror would be a necessary addition to the apparatus. Therefore, Examiner takes the position that the addition of a pipe as a means of protecting a reflective mirror is an obvious addition to an apparatus.

7. Regarding claim 23, it is known in the art that when space is limited one can exploit mirrors to increase the path of a laser light before impacting a substrate or target. Therefore, Examiner takes the position that the addition of reflective mirrors

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would have been an obvious modification to the apparatus taught by Suzuki et al. in view of Yukishige.

8. Regarding claim 24, Suzuki et al. teaches rotating target (column 7, line5).

Additionally, Iijima teaches a graphite target rod that is rotated about its axis (paragraph 5, line 5).

9. Regarding claim 25, Suzuki et al. teaches a condensing lens (column 11, lines 1-6). Although Suzuki et al. does not teach placing additional reflective lens Examiner takes the position that it is known in the art to use reflective lens to extend the laser path and additionally focus the laser beam. Furthermore, Suzuki et al. does not teach a condensing lens or any other type of lens between the window and the target, but Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time of the invention to place the lens and mirror between the window and target when using protective pipes because the pipes ensure the path of the laser beam will not be affected by said vapors and also that the vapors would not coat the mirror or lens.

10. Regarding claims 27-29, Suzuki et al. teaches angles of impact site and plumes of vapor (Figure 6). Furthermore, Examiner takes the position that the angle of impact and the angle of the plume created by the impact of the laser to the graphite target would be either inherent or an obvious occurrence of the method of impacting a target with a laser beam.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

11. Yoshida et al. (U.S Pat. No. 6,454,862 B1) teaches a system exploiting mirrors and converging lens to focus laser beam.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GUINEVER S. GREGORIO whose telephone number is

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(571)270-5827. The examiner can normally be reached on Monday-Thursday, 10:30-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gsg
December 17, 2008

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793